IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of.:		§		
	Ernest GRIMBERG	§		
Serial No.:	10/567,438	§		
Filed:	February 7, 2006	§	Group Art Unit:	2884
For:	RADIOMETERY USING AN UNCOOLED MICROBOLOMETER DETECTOR	§	Attorney Docket:	**31322**
Examiner:	Yara B. GREEN	§		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE

Sir:

This is in response to the United States Patent and Trademark Office Action mailed September 25, 2008, which response is being made on or before January 25, 2008, and for which a one month extension of time fee is due and enclosed herewith.

Applicant submits this response for entry into the record, in which:

Please amend the above-identified application as follows:

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In the Claims:

1-61. (Canceled)

62. (Currently Amended) An infra-red imaging camera comprising:

an uncooled and unshielded detector comprising an array of infra-red (IR) sensors arranged to detect infra red radiated energy,

a non-uniformity corrector, associated with said detector, operable to perform non-uniformity correction on outputs of said array to provide uniform outputs having a uniform response to energy detected at said uncooled sensor, and

a calibrator to carry out periodic calibration operations by taking at least one calibration temperature measurement over said camera and to derive from said at least one calibration temperature measurement a reference temperature indicative of radiated energy not from an external scene, said reference temperature being usable to correct energy detected at said uncooled detector to discount radiated energy not from an external scene, such that the reference temperature and the detector response to radiated energy impinging on said detector allow a temperature of objects in said camera's field of view to be calculated using a same signal to temperature function for each of said uniform outputs to obtain a temperature, wherein said reference temperature is a parameter of said function.

63. (Previously Presented) The infra-red imaging camera of claim 62, configured to combine a value from an initial calibration temperature measurement with a second value taken from a second calibration temperature measurement, said combining using a time-dependent function, to produce extrapolations of said corrections for later points in time after said calibration temperature measurements.

64. (Previously Presented) The infra-red imaging camera of claim 63, wherein said time-dependent function comprises a mathematical extrapolation function from most recent calibration temperature measurements.

65. (Previously Presented) The infra-red imaging camera of claim 62, configured to make said correction using an initial value which is a function of a temperature measurement of a shutter of said camera.

66. (Previously Presented) The infra-red imaging camera of claim 62, configured to make said correction using an initial value which is a function of a temperature measurement of a housing of said camera.

67. (Previously Presented) The infra-red imaging camera of claim 62, having a camera thermal time constant of a first duration, and wherein said calibrator is configured to make a plurality of said calibration temperature measurements during said first duration.

68. (Previously Presented) The infra-red imaging camera of claim 62, wherein a first thermistor is located on a shutter of said camera, a second thermistor is located on an external surface of detector's vacuum packaging of said camera and a third thermistor is located on a casing surrounding optics of said camera, and wherein said calibration temperature measurement comprises taking readings from each of said thermistors.

69. (Previously Presented) The infra-red imaging camera of claim 65, wherein said shutter comprises a sheet having an emissivity substantially approaching 1 within a spectral frequency range used by said detector, and wherein said uncooled detector is configured to make said calibration temperature measurement by measuring radiation from said shutter.

70 (Previously Presented) The infra-red imaging camera of claim 65, wherein said shutter comprises a sheet having a reflectivity substantially approaching 1 within a spectral frequency range used by said detector, and wherein said uncooled detector is configured to make said calibration temperature measurement by measuring radiation reflected from said shutter, said radiation being indicative of a temperature of said uncooled detector.

71. (Previously Presented) The infra-red imaging camera of claim 62, wherein said uncooled detector comprises a microbolometer array.

72. (Previously Presented) The infra-red detector of claim 62, operable to make said calibration temperature measurement at an interval of time less than the camera thermal time constant.

73. (Canceled).

74. (Currently Amended) Temperature correction apparatus, for correcting a response of a radiometer in accordance with a local camera temperature, said radiometer comprising:

an unshielded uncooled infra-red (IR) detector comprising an array of IR sensors~~sensor~~, configured for providing an image response in order to form a temperature image in accordance with IR radiation impinging on said IR detector's ~~sensor's~~ field of view (FOV), and

a shutter, configured for controllably obscuring said FOV, an internal face of said shutter forming a measurement surface for an internal temperature reference unit;

a non-uniformity corrector, associated with said detector, operable to perform non-uniformity correction on outputs of said array to provide uniform outputs having a uniform response to energy detected at said uncooled sensor,

said temperature correction apparatus comprising:

a temperature sensor configured for determining a local camera temperature using said measurement surface,

a referencer, configured for deriving from said local camera temperature a reference temperature indicative of radiated energy not from an external scene and for using a response of said IR sensor to said local camera temperature to approximate a temporal effect of temperature drift of said local temperature; and

a signal corrector associated with said temperature sensor and said referencer, said signal corrector being configured to discount impinging IR radiation not from an external source by calculating a temperature of objects in said radiometer's field of view in accordance with said ~~approximated temporal effect, the~~ uniform outputs~~detector level,~~ using a same signal to temperature function for each of said uniform outputs, wherein ~~and~~ said reference temperature is a parameter of said function.

75. (Currently Amended) Temperature correction apparatus according to claim 74, wherein said reference temperature and said response of said IR detector ~~sensor~~ to said local camera temperature are determined during the obscuration of said FOV by said shutter.

76. (Previously Presented) Temperature correction apparatus according to claim 74, wherein said approximation is a mathematical functional approximation based on previous measured data.

77. (Previously Presented) Temperature correction apparatus according to claim 74, wherein said IR sensor array is operable to provide a two-dimensional image.

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78. (Currently Amended) Temperature correction apparatus according to claim 74, wherein said IR detector ~~sensor~~ comprises an array of microbolometers, and wherein said signal corrector is operable to calculate a difference between a microbolometer level and a reference level comprising an average video signal of said IR sensor, and to use said difference as an input to said signal to temperature function~~to produce said correction~~.

79. (Currently Amended) A method for correcting a response of an uncooled and unshielded a radiometer in accordance with a calibration temperature measurement~~local temperature~~, said radiometer comprising an array of infra-red (IR) sensors~~sensor~~, for providing an image response in order to form a temperature image in accordance with IR radiation impinging on said IR sensor's field of view (FOV), and a shutter, for controllably obscuring said FOV, said method comprising:

performing~~determining~~, while said FOV is obscured by said shutter, a calibration temperature measurement to determine a local camera temperature ~~of a location selected in accordance with an emissivity of said shutter~~;

performing non-uniformity correction (NUC) on outputs of said array to provide uniform outputs having a uniform response to energy detected at said uncooled sensor;

deriving from said local camera temperature a reference temperature reflecting impinging IR radiation not from an external source; and

calculating a temperature of objects in said radiometer's field of view using a same signal to temperature function for each of said uniform outputs to obtain a temperature, wherein ~~in accordance with~~ said reference temperature is a parameter of said function.

80. (Previously Presented) A method according to claim 79, further comprising determining a time dependent response of said radiation sensor to said local camera temperature; and

using said reference response in modifying said correction in between determinations of said reference temperature.

81. (Previously Presented) A method for correcting a response of a radiometer according to claim 79, further comprising filtering said corrected image response to compensate camera MTF effects.

82-83. (Canceled)